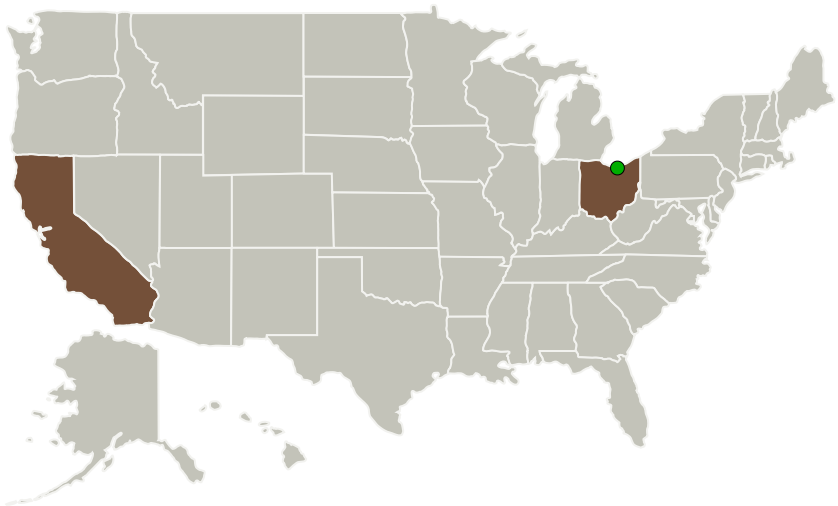
Light-Weight, Non-Contact Magnetic Transmission for UAV and Rotorcraft Applications, Phase I

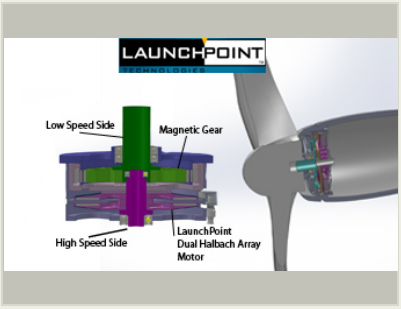
Completed Technology Project (2017 - 2017)

Project Introduction

Speed reducing units consisting of mechanical gears are widely used in applications to match high speed prime movers to low speed loads. All aerospace applications of gearboxes require lubrication, maintenance, and overhaul; and are subject to eventually wearing out due to tooth surface wear and gear tooth fatigue. In many cases the requirements for gearbox lubrication, maintenance/overhaul and service life limits are acceptable; but in some extreme applications these requirements become a severe performance limitation. For example, high altitude long endurance missions (HALE) typically operate at an altitude greater than 60,000 feet and stay in flight for durations longer than 24 hours. HALE vehicles need a lightweight, highly efficient solution to operate slow moving propellers maintenance free for an extended period of time in an extreme environment. We are proposing to develop a magnetic gearbox technology that can meet the needs of these extreme applications. A magnetic gearbox has many advantages over a traditional mechanical gearbox. The different rotating components in the magnetic gearbox will never touch so the only lubrication required is in the bearing systems. The magnetic gearbox will be essentially maintenance-free except for periodic bearing lubrication/inspection. Vibrations that do not exceed the pull-out torque of the magnetic teeth do not add measurably to the mechanical stresses in the magnetic gearbox so fatigue issues will be minimal. If the pull-out (maximum) torque is exceeded the magnetic gearbox will simply skip a tooth and re-engage when the overload situation is resolved. In the present research we have demonstrated an experimental magnetic gearbox that achieves much higher specific torque than any previously demonstrated design.

Primary U.S. Work Locations and Key Partners





LIGHT-WEIGHT, NON-CONTACT MAGNETIC TRANSMISSION FOR UAV AND ROTORCRAFT APPLICATIONS, Phase I Briefing Chart Image

Table of Contents

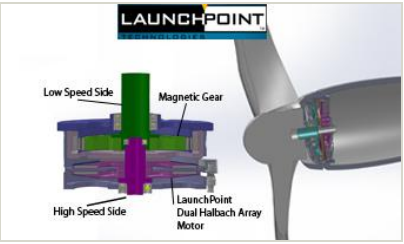
Light-Weight, Non-Contact Magnetic Transmission for UAV and Rotorcraft Applications, Phase I

Completed Technology Project (2017 - 2017)

Organizations Performing Work	Role	Type	Location
LaunchPoint Technologies, Inc.	Lead Organization	Industry	Goleta, California
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
California	Ohio

Images



Briefing Chart Image
LIGHT-WEIGHT, NON-CONTACT MAGNETIC TRANSMISSION FOR UAV AND ROTORCRAFT APPLICATIONS, Phase I Briefing Chart Image
(https://techport.nasa.gov/image/136413)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
LaunchPoint Technologies, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

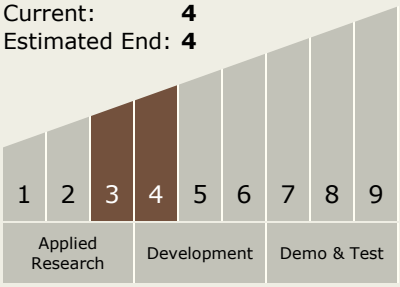
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Jessica A Dozoretz

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Light-Weight, Non-Contact Magnetic Transmission for UAV and Rotorcraft Applications, Phase I

Completed Technology Project (2017 - 2017)

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.3 Aero Propulsion
    - TX01.3.9 Hybrid Electric Systems

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System